

Surface Area & Volume of 3D Shapes



Today:

- We are going to look over our volume and surface area formulas
- We are also going to do an example of a cone
- Then we are going to work on our flip charts!

Project: Measurement Flip Chart

How to make your flip chart:

1. You need 3 sheets of paper
2. Lay the 3 sheets on top of one another and fold (watch demonstration)
3. Put 3 staples on the top (watch demonstration)

Your flip chart will contain the following:

Top Page: Title Page "Measurement Flip Chart"

Page 1: Perimeter/Area of a composite object

Page 2: Cone

Page 3: Rectangular Prism $\longrightarrow V = l \times w \times h$

Page 4: Rectangular Pyramid

Page 5: Sphere, Cylinder

- Your diagrams must be very neat (use ruler where necessary and draw pictures in pencil first!). Make sure to properly label your diagrams.
- Your writing must also be as neat as possible!
- There should be an example included for each object

Your flip chart will be marked as follows:

- Overall appearance/Effort/Neatness /10
- Page One:
 - Diagram /2
 - Formulas /3
 - Example /3 /8
- Pages Two to Five:
 - Diagrams (each worth two) /8
 - Formulas (each worth one) /8
 - Examples (each worth one) /8 /24

(one diagram, surface area AND volume formula, and 2 examples per page!)

Total Value /42

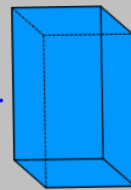
Surface Area

When finding surface area of any 3D object, all you need to do is find the area of each face of the object and then add them all together!

When finding the surface area of an object, you can either use a model, sketch a diagram, or visualize the object. For all options, you will need to be able to calculate the answer.

Definitions:

1. "Faces" are the sides of the object.
 - for example, a rectangular prism, has 6 faces.
 - 3 pairs of rectangles



2. A Composite Object is an object composed of 2 or more objects.

Area Formulas

To find area:

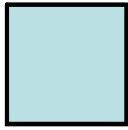
Area of a rectangle = length x width (l x w)

Area of a triangle = $\frac{\text{base} \times \text{height}}{2}$

Area of a circle = πr^2

LETS REVIEW

Perimeter and Area



Perimeter of a Square

$$P = 4s$$



Area of a Square

$$A = s^2$$



Perimeter of a Rectangle

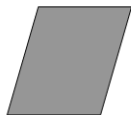
$$P = 2L + 2W$$



Area of a Rectangle

$$A = LW \text{ or } Bh$$

LETS REVIEW



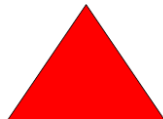
Perimeter of a Parallelogram

$$P = 2b + 2s$$



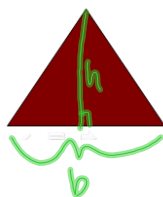
Area of a Parallelogram

$$A = bh$$



Perimeter of a Triangle

$$P = s + s + s$$



Area of a Triangle

$$A = \frac{bh}{2}$$

LETS REVIEW



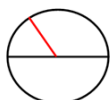
Perimeter of a Trapezoid

$$P = s + s + s + s$$



Area of a Trapezoid

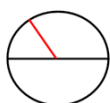
$$A = \frac{h(a+b)}{2}$$



Circumference of a Circle

$$C = \pi d$$

or $C = 2\pi r$



Area of a Circle

$$A = \pi r^2$$

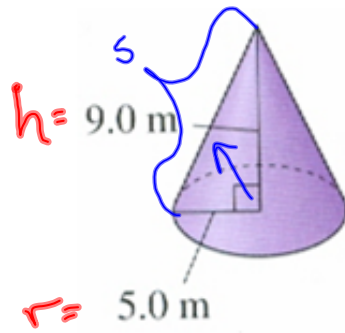
$$\pi = 3.14$$

$$r = \frac{d}{2}$$

LETS REVIEW

Surface Area

	<p>Surface area of Rectangular Prism</p>	<p>Total Surface Area $V = lwh$ $= 2(\text{top and Bottom}) + 2(\text{Ends}) + 2(\text{Front and Back})$</p>
	<p>Surface Area of a Triangular Prism</p>	<p>Total Surface Area $= \text{Bottom} + 2(\text{Ends}) + \text{Front} + \text{Back}$</p>
	<p>Surface Area of a Pyramid</p>	<p>Total Surface Area $= \text{Bottom} + 4(\text{sides})$</p>
	<p>Surface Area of a Cone</p>	<p>Total Surface Area $= \text{Circle} + \text{curved surface}$ $= \pi r^2 + \pi r S$</p>

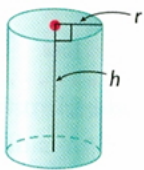


$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 &= 5^2 + 9^2 \\
 &= 25 + 81 \\
 &= \sqrt{106} \\
 &= 10.3 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 SA &= \pi r^2 + \pi r s \\
 &= (3.14)(5)^2 + (3.14)(5)(10.3) \\
 &= 78.5 + 161.71 \\
 &= 240.2 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 V &= \frac{\pi r^2 h}{3} = \frac{(3.14)(5)^2(9)}{3} \\
 &= 235.5 \text{ m}^3
 \end{aligned}$$

LETS REVIEW

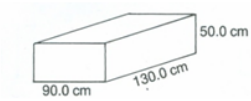


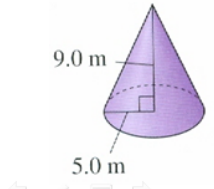


Surface area of
Cylinder

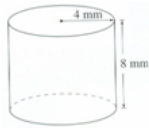
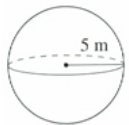
$$\begin{aligned}
 \text{Total Surface Area} &= 2(\text{circles}) + \text{curved surface} \\
 &= 2(\pi r^2) + \pi d h
 \end{aligned}$$

LETS REVIEW

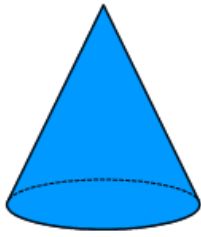
Volume

	Volume of Rectangular Prism	$V = \text{Area of base} \times \text{height}$ $V = lwh$
	Volume of a Triangular Prism	$V = \text{Area of base} \times \text{height}$ $V = \frac{bh}{2}(h)$
	Volume of a Pyramid	$V = \frac{1}{3} \text{Area of base} \times \text{height}$
	Volume of a Cone	$V = \frac{1}{3} \text{Volume of cylinder}$ $V = \frac{1}{3} \pi r^2 h$

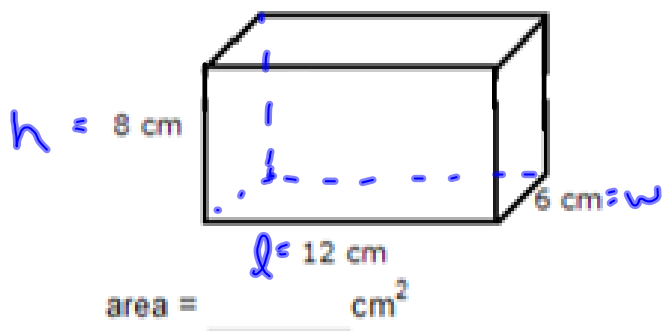
LETS REVIEW

	Volume of Cylinder	$V = \text{Area of base} \times \text{height}$ $V = \pi r^2 h$
	Volume of a Sphere	$V = \frac{4}{3} \pi r^3$

Practice



Practice

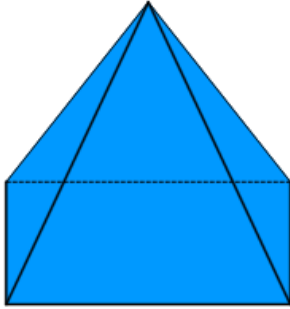


$$V = l \cdot w \cdot h$$
$$=$$

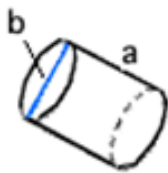
SA
Bottom + Top
 $l \times w \times 2$
 $12 \times 6 \times 2$
 $=$

ends
Front + Back

Practice



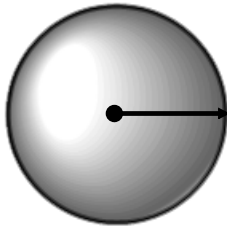
Practice



$$a = 14 \text{ in}$$

$$b = 10.2 \text{ in}$$

Practice



Surface area and Volume formulas

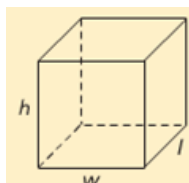
$$\text{Surface area} = \frac{1}{2}s(\text{perimeter of base}) + (\text{base area})$$

$$V = \frac{1}{3}lwh$$

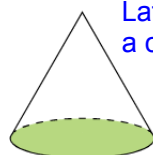


Pyramid

$$\begin{aligned} \text{SA} &= 2lh + 2lw = 2wh \\ \text{V} &= lwh \end{aligned}$$



$$\begin{aligned} \text{SA} &= \pi rs + \pi r^2 \\ \text{V} &= \frac{1}{3}\pi r^2 h \end{aligned}$$



Cone

Lateral Area of
a cone:

$$A_L = \pi rs$$

$$\text{SA} = 2\pi r^2 + 2\pi rh$$

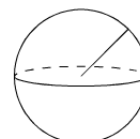
$$\text{V} = \pi r^2 h$$



Cylinder

$$\text{SA} = 4\pi r^2$$

$$\text{V} = \frac{4}{3}\pi r^3$$



Sphere

Attachments

geometry review.ppt